

Amendment to the Claims:

This listing of claims replaces all prior versions, and listings, of claims in the application:

1-24. (Canceled)

25. (Original) A device for optically measuring a sample, comprising:

a waveguide to receive and guide an input beam in a first propagation mode;

a probe head coupled to the waveguide to receive the input beam and to reflect a first portion of the input beam back to the waveguide in the first propagation mode and direct a second portion of the input beam to a sample, the probe head collecting reflection of the second portion from the sample and exporting to the waveguide the reflection as a reflected second portion in a second propagation mode different from the first propagation mode; and

a detection module to receive the reflected first portion and the reflected second portion in the waveguide and to extract information of the sample carried by the reflected second portion.

26. (Original) The device as in claim 25, further comprising:

an optical delay device in an optical path of the reflected first and second portions to produce a relative phase delay between the reflected first and second portions; and

an optical delay modulator in the optical path of the reflected first and second portions to modulate the relative phase.

27. (Original) The device as in claim 25, further comprising an optical delay modulator in an optical path of the reflected first and second portions to produce a relative phase delay between the reflected first and second portions and to modulate the relative phase.

28. (Original) The device as in claim 25, further comprising a variable optical delay unit in an optical path of the reflected first and second portions to produce a variable relative phase delay between the reflected first and second portions, wherein the variable optical delay unit comprises:

a mode splitting unit to separate the reflected first portion in the first propagation mode and the second portion in the second propagation mode into a first optical path and a second optical path, respectively; and

a variable optical delay element in one of the first and the second optical paths to adjust an optical path length.

29-112. (Canceled)

113. (Original) A device for optically measuring a sample, comprising:

a waveguide, which supports a first propagation mode and a second, different propagation mode, to receive and guide an input beam in both the first and the second propagation modes;

a probe head coupled to the waveguide to receive the input beam and to reflect a first portion of the input beam in the first propagation mode back to the waveguide in the first propagation mode and direct a second portion of the input beam in the second propagation mode to a sample, the probe head collecting reflection of the second portion from the sample and

exporting to the waveguide the reflection as a reflected second portion in the second propagation mode; and

a detection module to receive the reflected first portion and the reflected second portion in the waveguide and to extract information of the sample carried by the reflected second portion.

114. (Original) The device as in claim 113, further comprising:

an optical delay device in an optical path of the reflected first and second portions to produce a relative phase delay between the reflected first and second portions; and

an optical delay modulator in the optical path of the reflected first and second portions to modulate the relative phase.

115. (Original) The device as in claim 113, further comprising an optical delay modulator in an optical path of the reflected first and second portions to produce a relative phase delay between the reflected first and second portions and to modulate the relative phase.

116. (Original) The device as in claim 113, further comprising a variable optical delay unit in an optical path of the reflected first and second portions to produce a variable relative phase delay between the reflected first and second portions, wherein the variable optical delay unit comprises:

a mode splitting unit to separate the reflected first portion in the first propagation mode and the second portion in the second propagation mode into a first optical path and a second optical path, respectively; and

a variable optical delay element in one of the first and the second optical paths to adjust an optical path length.

117-154. (Canceled)

155. (Original) A device for optically measuring a sample, comprising:

a waveguide, which supports at least an input propagation mode of light, to receive and guide an input beam in the input propagation mode;

a probe head coupled to the waveguide to receive the input beam and to reflect a first portion of the input beam back to the waveguide in the input propagation mode and direct a second portion of the input beam in the input propagation mode to a sample, the probe head collecting reflection of the second portion from the sample and exporting to the waveguide the reflection as a reflected second portion in the input propagation mode; and

a detection module to receive the reflected first portion and the reflected second portion in the input propagation mode from the waveguide and to extract information of the sample carried by the reflected second portion.

156. (Original) The device as in claim 155, wherein the detection module comprises:

a beam splitter to split received light into a first beam and a second beam;

a first optical path to receive the first beam;

a second optical path to receive the second beam;

a beam combiner optically coupled to the first and the second optical paths to combine the first and second beams and to split the combined beam into a first output beam in a first

propagation mode and a second output beam in a second propagation mode;

a first optical detector to receive the first output beam;
and

a second detector to receive the second output beam.

157. (Original) The device as in claim 156, wherein the detection module comprises a variable optical delay element in the second optical path to adjust a relative delay between the first and the second beams at the beam combiner.

158. (Original) The device as in claim 156, wherein the beam combiner is a polarization beam splitter and the first and the second propagation modes are two orthogonal polarization modes.

159. (Original) The device as in claim 155, wherein the optical probe head comprises an optical partial reflector which reflects the first portion of the input beam back to the waveguide.

160. (Original) The device as in claim 155, further comprising a tunable optical filter in an optical path of light to tune the frequency of the first and second output beams to measure the sample with a spectral bandwidth of the filter.

161. (Original) The device as in claim 155, further comprising a positioning mechanism coupled to adjust a relative lateral position between the optical probe head and the sample to direct the second portion to reach different locations on the sample to obtain information of the sample at the different locations.